

23 computer readable program code means for
24 causing a computer to affect adjusting encoding of
25 said macroblock when said macroblock activity
26 level exceeds said predefined threshold to
27 conserve bits used in encoding said macroblock and
28 thereby save bits otherwise used to encode said
29 noisy portion of said frame.

B12
cancel.
84
D12

Remarks

Applicants' claimed invention has been carefully reviewed in light of the Office Action in which claims 17-23, 31-36 and 38 were subject to restriction under 35 U.S.C. § 121, in which claims 1-3, 7, 9, 24, 25, 28 and 37 were rejected under 35 U.S.C. § 102(e) as being anticipated by Uz (U.S. Patent No. 5,771,316), and in which claims 4, 5, 11-13, 15, 16 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Uz. These rejections are respectfully traversed, and reconsideration thereof is requested. Claims 1-10 and 12-38 remain pending.

Initially, applicants hereby confirm the provisional election to continue prosecuting claims 1-16, 24-30 and 37 drawn to adaptive encoding. However, applicants respectfully traverse the restriction requirement for the following reason.

As amended, independent claims 1, 24 and 37 each recite determining whether the frame includes a noisy portion, and if so, then performing the adaptive encoding specified. Claims 17-23, 31-36, and 38 are drawn to a method for encoding a frame of sequence in frames which includes determining whether the frame includes a random noise portion. Applicants respectfully submit

that as amended the subject matter of Group I is very closely related to the subject matter of Group II. In fact, applicants respectfully submit that a complete search of either invention should entail an examination of the other referenced class and subclass. Thus, because of the closeness of the subject matter, and the probable overlapping searches, applicants respectfully submit that there would be of little additional burden on the Examiner to examine Group II claims in one application with the amended Group I claims. Since there is little additional burden, applicants respectfully submit that restriction is no longer proper between the claims, and accordingly, applicants request reconsideration and withdrawal of the outstanding restriction requirement.

By this paper, independent claims 1, 24 and 37 have been amended to more distinctly state certain aspects of the applicants' invention. Specifically, the content of dependent claim 11 has been incorporated into the amended independent claims. Therefore, claim 11 has been canceled and claim 12 has been amended to now reference independent claim 1. Support for these amendments can be found throughout the specification. Specifically, the current invention relates to encoding frames having a noisy portion. See page 3, lines 20-23.

The present invention addresses the problem of encoding an image containing one or more areas of significantly contrasted complexity. The invention enhances picture quality by adjusting the encoding of highly complex macroblocks to use less bits. The invention recites, for example, in claim 1 a method for encoding a frame comprising multiple macroblocks. The method comprises

first determining whether the frame includes a noisy portion, and if so, then for each macroblock, determining a macroblock activity level; determining when the activity level exceeds a predefined complexity threshold thereby indicating that the macroblock is associated with the noisy portion of the frame; and adjusting encoding when the activity level exceeds the predefined complexity threshold to conserve bits used in encoding the macroblock and thereby save bits otherwise used to encode the noisy portion of the frame.

As noted, the Office Action cites Uz as allegedly anticipating applicants' claimed invention. This conclusion and the characterizations of the teachings of Uz are respectfully traversed.

Uz describes a rate control algorithm for an MPEG-2 compliant encoder. See abstract. The Uz invention relates to fade detection. Abstract. Uz detects a fade by comparing the DC luminance values of consecutive images. Col. 12, lines 28-29. This information is subsequently used to determine the sequence of I, P, and B frames to be used to encode the images. Col. 12, lines 32-35. The invention avoids the use of B frames which result in a large number of bits when used in a fade sequence. Col. 12, lines 35-36.

Initially, applicants note that Uz does not even address or discuss the same problem as that to which the present invention is directed. Uz addresses encoding a sequence of frames over which an image is being faded. The current invention addresses encoding an image containing a noisy portion. Applicants submit

that determining when an image is being faded over a sequence of frames, and when an image contains a noisy portion are entirely unrelated and distinct problems.

Uz discloses a method for determining whether an image is being faded by comparing the DC luminance values of successive frames. Col. 12, lines 28-29. This information is used to determine the sequence of I, P, and B frames to be used in encoding the series of images. Col. 12, lines 33-35. In contrast, the current invention determines whether a frame contains a noisy portion. The noisy portion is determined by comparing macroblock activity levels within the frame. A high activity level indicates the macroblock is within a noisy portion of the image, and the encoding is adjusted to use fewer bits for the macroblock.

Therefore, Uz adjusts the encoding of a series of frames based upon a finding that the frames are fading an image, while the current invention adjusts the encoding of a single frame based upon the difference in activity levels of the macroblocks comprising the single frame. The current invention preserves more bits for the less noisy areas of the image at the expense of the highly complex image area of the frame. Uz makes no similar adjustment.

While both inventions calculate values for macroblocks, the two inventions implement these calculations in distinct manners. To calculate the activity and masking activity levels, Uz uses not only the blocks comprising the current macroblock, but the eight blocks that surround the current macroblock. Col. 9, lines

20-21. In contrast, the current invention uses only information within the current macroblock in obtaining values for the macroblock. Therefore, applicants respectfully submit that these calculations are fundamentally different.

Through the amendments presented, applicants place emphasis on determining whether the frame to be encoded contains a noisy portion. Uz lacks any discussion related to this problem. In rejecting claim 11, the Office Action states that "it is obvious that said frame is comprised of one frame of a sequence of frames." The applicants agree.

However, the Office Action fails to address the distinguishing element of the claim now incorporated in the independent claims. That is, the Office Action fails to cite Uz for disclosing the determination of "whether said frame includes a noisy portion."

To summarize, applicants respectfully submit that distinguishing subject matter of dependent claim 11 has been incorporated into each of independent claims 1, 24 and 37 presented herewith. Therefore, the anticipation rejection to claims 1-3, 7, 9, 24, 25, 28 and 37 is believed moot. With respect to the obviousness rejection of claims 4, 5, 11-13, 15, 16 and 26, applicants respectfully submit that there is no teaching, suggestion or implication in Uz of applicants' recited concept of determining whether a frame has a noisy portion. Further, with respect to original claim 11, the Office Action is silent as to this aspect of applicants' claimed invention. Since there is no suggestion in the prior art, or convincing rationale

as to the level of artisan which would have led them, to do what applicants have claimed, applicants respectfully request reconsideration of the obviousness rejection and allowance of all claims presented herewith.

The dependent claims are believed allowable for the same reasons as the independent claims, as well as for their own additional characterizations. For example, in claim 26 the applicants recite a system for determining a macroblock activity level wherein the macroblock comprises multiple blocks. The system comprises means for determining an activity level for each block of the macroblock, and means for ordering activity levels of the blocks and comparing the minimum activity level with the next to minimum activity level to derive an activity level for the macroblock.

In rejecting this claim, the Office Action cites Uz as teaching the determination of an activity level. However, Uz computes its values by using the minimum values from the blocks within the macroblock as well as those surrounding the macroblock. Col. 9, lines 12-21. Therefore, Uz always uses the minimum value calculated from blocks within and surrounding the macroblock as the value for the macroblock. In contrast, the current invention prioritizes the block values of those blocks contained within the macroblock from minimum to maximum. The invention then derives the macroblock activity level by comparing the minimum and next to minimum values. In as much as Uz can be applied to the current invention, Uz teaches away from both the use of information exclusively within the macroblock, as well as the use of a value other than the minimum as an activity level

for the macroblock.

Obtaining the minimum value as taught by Uz does not require the ordering of values as recited by applicants. Applicants respectfully submit that the ordering of all block values is not disclosed, taught or suggested by Uz's use of the minimum value in calculating macroblock values.

Finally, applicants gratefully acknowledge the Examiner's indication of allowability of claims 6, 8, 10, 14, 27, 29 & 30 if rewritten in independent form. These claims have not been rewritten herein, however, since the independent claims from which they depend are believed to recite patentable subject matter for the reasons stated above.

In view of the above, allowance of all claims presented herewith is respectfully requested. If, however, any issue remains unresolved, the Examiner is invited to telephone applicants' undersigned representative to further discuss the application.

Respectfully submitted,



Kevin P. Radigan, Esq.
Attorney for Applicants
Registration No. 31,789

Dated: September 28, 2000

HESLIN & ROTHENBERG, P.C.
5 Columbia Circle
Albany, New York 12203
Telephone: (518) 452-5600
Facsimile: (518) 452-5579